

**WHAT IS CLAIMED IS:**

- 1           1. A method of sialylating a saccharide group on a recombinant  
2       glycoprotein, the method comprising contacting a saccharide group which comprises a  
3       galactose or N-acetylgalactosamine acceptor moiety on a recombinant glycoprotein with a  
4       sialic acid donor moiety and a recombinant sialyltransferase in a reaction mixture which  
5       provides reactants required for sialyltransferase activity for a sufficient time and under  
6       appropriate conditions to transfer sialic acid from said sialic acid donor moiety to said  
7       saccharide group.
  
- 1           2. The method of claim 1, wherein the sialic acid donor moiety is CMP-  
2       sialic acid.
  
- 1           3. The method of claim 2, wherein the CMP-sialic acid is enzymatically  
2       generated *in situ*.
  
- 1           4. The method of claim 1, wherein the sialyltransferase is a recombinant  
2       eukaryotic sialyltransferase which substantially lacks a membrane-spanning domain.
  
- 1           5. The method of claim 1, wherein the sialyltransferase includes a sialyl  
2       motif which has an amino acid sequence that is at least about 40% identical to a sialyl motif  
3       from a sialyltransferase selected from the group consisting of ST3Gal I, ST6Gal I, and  
4       ST3Gal III.
  
- 1           6. The method of claim 1, wherein the sialyltransferase is a recombinant  
2       ST3Gal III.
  
- 1           7. The method of claim 6, wherein the sialyltransferase is a recombinant  
2       rat ST3Gal III.
  
- 1           8. The method of claim 1, wherein the sialyltransferase is a recombinant  
2       ST3Gal IV.

1                   9. The method of claim 1, wherein the sialyltransferase is a recombinant  
2 ST6Gal I.

1                   10. The method of claim 1, wherein the sialyltransferase is a recombinant  
2 ST3Gal I.

1                   11. The method of claim 10, wherein the reaction mixture comprises a  
2 second recombinant sialyltransferase, which second recombinant sialyltransferase is an  
3 ST3Gal III.

1                   12. The method of claim 1, wherein the sialyltransferase is a recombinant  
2 bacterial sialyltransferase.

1                   13. The method of claim 12, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a *Neisseria*  
3 *meningitidis* 2,3-sialyltransferase.

1                   14. The method of claim 13, wherein the bacterial sialyltransferase is a  
2 *Neisseria meningitidis* 2,3-sialyltransferase.

1                   15. The method of claim 12, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3 *Photobacterium damsela* 2,6-sialyltransferase.

1                   16. The method of claim 15, wherein the bacterial sialyltransferase is a  
2 *Photobacterium damsela* 2,6-sialyltransferase.

1                   17. The method of claim 12, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3 *Haemophilus* 2,3-sialyltransferase.

1               18. The method of claim 17, wherein the sialyltransferase is a *Haemophilus*  
2   2,3-sialyltransferase.

1               19. The method of claim 12, wherein the bacterial sialyltransferase has an  
2   amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3   *Campylobacter jejuni* 2,3-sialyltransferase.

1               20. The method of claim 19, wherein the sialyltransferase is a  
2   *Campylobacter jejuni* 2,3-sialyltransferase.

1               21. The method of claim 1, wherein the sialyltransferase is produced by  
2   recombinant expression of a sialyltransferase in a host cell selected from the group  
3   consisting of an insect cell, a mammalian cell, and a fungal cell.

1               22. The method of claim 21, wherein the host cell is an *Aspergillus niger*  
2   cell.

1               23. A method of sialylating a saccharide group on a recombinant  
2   glycoprotein, the method comprising contacting a saccharide group which comprises a  
3   galactose or an N-acetylgalactosamine acceptor moiety on a recombinant glycoprotein with a  
4   sialic acid donor moiety and a bacterial sialyltransferase in a reaction mixture which  
5   provides reactants required for sialyltransferase activity for a sufficient time and under  
6   appropriate conditions to transfer sialic acid from said sialic acid donor moiety to said  
7   saccharide group.

1               24. The method of claim 23, wherein the bacterial sialyltransferase has an  
2   amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3   *Photobacterium damsela* 2,6-sialyltransferase.

1               25. The method of claim 24, wherein the bacterial sialyltransferase is a  
2   *Photobacterium damsela* 2,6-sialyltransferase.

1           26. The method of claim 23, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a *Neisseria*  
3 *meningitidis* 2,3-sialyltransferase.

1           27. The method of claim 26, wherein the sialyltransferase is a *Neisseria*  
2 *meningitidis* 2,3-sialyltransferase.

1           28. The method of claim 23, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3 *Campylobacter jejuni* 2,3-sialyltransferase.

1           29. The method of claim 28, wherein the sialyltransferase is a  
2 *Campylobacter jejuni* 2,3-sialyltransferase.

1           30. The method of claim 23, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3 *Haemophilus* 2,3-sialyltransferase.

1           31. The method of claim 30, wherein the sialyltransferase is a *Haemophilus*  
2 2,3-sialyltransferase.

1           32. A method for *in vitro* sialylation of saccharide groups present on a  
2 glycoprotein, said method comprising contacting said saccharide groups with a  
3 sialyltransferase, a sialic acid donor moiety, and other reactants required for sialyltransferase  
4 activity for a sufficient time and under appropriate conditions to transfer sialic acid from said  
5 sialic acid donor moiety to said saccharide group, wherein said sialyltransferase is present at  
6 a concentration about 50 mU per mg of glycoprotein or less.

1           33. The method of claim 32, wherein the sialyltransferase is present at a  
2 concentration of between about 5-25 mU per mg of glycoprotein.

1           34. The method of claim 32, wherein the sialyltransferase is present at a  
2 concentration of between about 10-50 mU/ml of reaction mixture and the glycoprotein is  
3 present in the reaction mixture at a concentration of at least about 2 mg/ml.

1           35. The method of claim 32, wherein the method yields a glycoprotein  
2 having sialylation of at least about 80% of terminal galactose residues present on the  
3 saccharide groups.

1           36. The method of claim 32, wherein the sialyltransferase is a recombinant  
2 sialyltransferase.

1           37. The method of claim 36, wherein the sialyltransferase substantially  
2 lacks a membrane-spanning domain.

1           38. The method of claim 32, wherein the sialyltransferase includes a sialyl  
2 motif which has an amino acid sequence that is at least about 40% identical to a sialyl motif  
3 from a sialyltransferase selected from the group consisting of ST3Gal I, ST6Gal I, and  
4 ST3Gal III.

1           39. The method of claim 32, wherein the sialyltransferase is an ST3Gal III.

1           40. The method of claim 39, wherein the ST3Gal III is a rat ST3Gal III.

1           41. The method of claim 32, wherein the sialyltransferase is an ST3Gal IV.

1           42. The method of claim 32, wherein the sialyltransferase is an ST3Gal I.

1           43. The method of claim 42, wherein the reaction mixture comprises a  
2 second recombinant sialyltransferase, which second recombinant sialyltransferase is an  
3 ST3Gal III.

1           44. The method of claim 32, wherein the sialyltransferase is a bacterial  
2 sialyltransferase.

1           45. The method of claim 44, wherein the bacterial sialyltransferase is a  
2 recombinant sialyltransferase.

1           46. The method of claim 44, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a *Neisseria*  
3 *meningitidis* 2,3-sialyltransferase.

1           47. The method of claim 46, wherein the bacterial sialyltransferase is a  
2 *Neisseria meningitidis* 2,3-sialyltransferase.

1           48. The method of claim 44, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3 *Photobacterium damsela* 2,6-sialyltransferase.

1           49. The method of claim 48, wherein the bacterial sialyltransferase is a  
2 *Photobacterium damsela* 2,6-sialyltransferase.

1           50. The method of claim 44, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3 *Campylobacter jejuni* 2,3-sialyltransferase.

1           51. The method of claim 50, wherein the sialyltransferase is a  
2 *Campylobacter jejuni* 2,3-sialyltransferase.

1           52. The method of claim 44, wherein the bacterial sialyltransferase has an  
2 amino acid sequence which is at least 50% identical to an amino acid sequence of a  
3 *Haemophilus* 2,3-sialyltransferase.

1               53. The method of claim 52, wherein the sialyltransferase is a *Haemophilus*  
2 2,3-sialyltransferase.

1               54. The method of claim 32, wherein the sialic acid donor moiety is CMP-  
2 sialic acid.

1               55. The method of claim 54, wherein the CMP-sialic acid is enzymatically  
2 generated *in situ*.

1               56. The method of claim 32, wherein the sialic acid is selected from the  
2 group consisting of NeuAc and NeuGc.

1               57. A method for *in vitro* sialylation of saccharide groups present on a  
2 glycoprotein, the method comprising contacting the saccharide groups with an ST3Gal III  
3 sialyltransferase, a sialic acid donor moiety, and other reactants required for sialyltransferase  
4 activity for a sufficient time and under conditions to transfer sialic acid from said sialic acid  
5 donor moiety to said saccharide group, wherein said ST3Gal III sialyltransferase is present at  
6 a concentration of less than about 50 mU per mg of glycoprotein.

1               58. The method of claim 57, wherein the method further comprises  
2 contacting the saccharide groups with an ST6Gall sialyltransferase.